ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code: AMABA01150**
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Sorex palustris*
COMMON NAME: Water Shrew, American Water Shrew, Northern Water Shrew
SYNONYMS:
FAMILY: Soricidae

AUTHOR, PLACE OF PUBLICATION: *S. palustris*: Richardson, 1828. *S. p. navigator*: Baird, 1858, Mammals, in rep. Expl. Surv. Railr. To Pacific, 8(1): 11.

TYPE LOCALITY: *S. palustris*: marshy places, from Hudson's Bay to the Rocky Mountains. *S. p. navigator*: near head of Yakima River, Cascade Mountains, Kittitas County, Washington.

TYPE SPECIMEN: J. G. Cooper (s.n.), 1953.

TAXONOMIC UNIQUENESS: One of nine species in the Genus *Sorex*, five of which occur in Arizona. There are nine subspecies in the species *palustris*, one of which occurs in this State (*S. p. navigator*, not endemic to Arizona).

DESCRIPTION: A large, long-tailed shrew, with hind feet fringed with stiff hairs. The adult sexes are similar in size and color, with measurements as follows: total length of 13-17 cm (5.12-6.7 in); tail length of 5.7-8.9 cm (2.25-3.5 in); length of hind foot 1.8-2.2 cm (0.7-0.87 in); weight ranges of 12-18 g. Tail is distinctly bicolored; dark above and light below. The pelage is generally black or gray frosted dorsally and white tinged with gray or brown ventrally. The chin is usually lighter in color than other parts of the body. The head has bead-like eyes, inconspicuous ears, a pointed snout, and 32 simple teeth, mostly with sharp single-cusps. The skull is large and each side of the upper jaw has five unicuspid teeth; each premolar bears a distinctive, medially directed, pigmented ridge. The anterior part of the rostrum is comparatively short and not curved ventrally. No post-mandibular foramen. (Beneski, Jr. and Stinson 1987).

AIDS TO IDENTIFICATION: *Sorex palustris* differs from *S. monticolus*, *S. merriami*, *S. arizonae*, and *S. nanus*, and from *Notiosorex crawfordi* in longer head and body, tail and hind feet; fringe of stiff hairs on hind feet; color blackish or slate gray rather than some shade or mixture of brown; skull longer. It also differs further from *S. merriami* and *S. arizonae* in no post-mandibular foramen; from *Notiosorex crawfordi* in five rather than three upper unicuspids (Hoffmiester 1986).

ILLUSTRATIONS: Color photo (Whitaker, Jr., 1996:plate 8)
Color drawing (Burt and Grossenheider, 1980:plate 1)
Color photos (http://members.vienna.at/shrew/fotos-palustr-ornatus.html)

TOTAL RANGE: The boreomontane regions of North America, including much of Canada, southwestern Alaska, and northern and mountainous regions of the United States.

RANGE WITHIN ARIZONA: White Mountains, Apache County. This population is disjunct by 200 miles from the nearest population in southern Utah, and 300 miles from the population in northern New Mexico.

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: The water shrew is always associated with water. Per Beneski, Jr. and Stinson (1987) "they are capable of sustaining forced dives of 31.1 to 47.7 seconds, along with reducing their metabolic demands, thereby allowing them to dive year-round in cold mountain streams. Remaining underwater is difficult because during a dive a water shrew is surrounded by a silvery layer of air that causes it to surface and float like a cork whenever it stops paddling. The fringe of hairs on the hindfoot, increases the foot's surface area, trapping air bubbles, which allows this shrew to actually run on the water's surface. Water shrews molt in fall and spring; winter pelage is somewhat paler than summer pelage. Flank glands, composed of enlarged sweat and sebaceous glands, are present in all shrews. In coping with their environment, water shrews seem to use their environment, and seem to use their sensory abilities synergistically; however, the relative acuity and functional significance of individual senses are not well understood. The vibrissae and sensitive muzzle of water shrews seem to aid in detection of prey (especially when diving), and the vibrissae also may serve as lateral feels in confined areas. The hearing ability seems acute to distances of 3 meters, particularly for high-pitched sounds."

Water shrews are very active, foraging day and night year-round to fuel their high metabolic rate and prodigious appetite. They need to consume approximately their weight in food every day (Conway 1952, Sorenson 1962 in NatureServe 2001). In the wild they seem unable to store significant body fat and can die of starvation within a few hours. When a surplus of food is available, it is often hoarded, the shrew sometimes defecating on it to keep other shrews away. Two major activity periods have been reported: sunset to 4 hours after sunset; and just before sunrise. They enter a relatively deep slumber for an hour or two at time, several times each day. Nests constructed of sticks, leaves and moss (or other soft material), are found in tunnels and in or under hollow logs within 10 feet of water; mean diameter of 8 cm. Captive water shrews neither defended individual nests nor nested in social groups. They were generally solitary and most intraspecific behavior was antagonistic (Sorenson 1962 in Beneski, Jr. and Stinson 1987). Much of the water shrew's food, including small fish, is probably taken while swimming or diving, which makes them vulnerable to predatory fish,

garter and water snakes, marsh birds, hawks, and owls. They lead short and intense lives, with an average life-span measured in months (Belitsky 1992). Average life-span around 18 months.

REPRODUCTION: In water shrews, ovulation is not spontaneous, but induced by copulation, as reported in other shrews. May begin breeding as early as January and continue through August. Adult females produce two or three litters per breeding season. The gestation period is not known, but for most shrews is approximately 21 days (ranges from 17-28 days). Estimated duration of gestation and lactation in the water shrew does not exceed 10 weeks (Conway 1952 in Beneski, Jr. and Stinson 1987). Gestation ranges from 17-28 days. Females have six mammae, two pair abdominal and one pair inguinal. Embryo counts range from 3 to 10, with 6 being the most common. The young, born blind and naked, are weaned within 2 to 4 weeks and are reproductively active within a few months of birth. Water shrews mature earlier and with greater individual variation than reported for other *Sorex* species, although most females do not reproduce until after their first winter. Females born early in year may reproduce later the same year.

FOOD HABITS: Usually prey on insects and other invertebrates (worms and snails). May take small vertebrates (fish, fish eggs, amphibians, carrion) when available. They will continue to feed in winter, diving under ice to do so.

HABITAT: Common in boreal and montane riparian habitats. Found in shallow tunnels and runways through grasses, sedges, reeds, and willow and alder thickets and other vegetation along ponds, marshes, and edges of swift-flowing streams with rocks, logs, crevices, and overhanging banks. Occasionally trapped near slow-moving streams, dry ephemeral creek beds, and small springs. A study conducted by Clark (1973) indicated that water shrews were most common in habitats of approximately 75% ground cover (Clark 1973 cited in Markow and Hocutt 1994).

ELEVATION: 8,200 - 9,630 ft. (2501 - 2937 m) in Arizona.

PLANT COMMUNITY:

POPULATION TRENDS: Unknown.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: None
STATE STATUS: WC (WSCA, AGFD in prep)
[Endangered, TNW AGFD 1988]

OTHER STATUS:

MANAGEMENT FACTORS: Recreational and livestock use of riparian (streamside) and lacustrine (lakeside) habitats may have caused a decline of the water shrew in Arizona.

However, limited information on habitat and population status precludes specific delineation of management needs (Belitsky 1992). Suitable management consists primarily of maintaining their requirements, which includes: high quality water, preferably mountain streams, and abundant cover such as rocks, logs, or overhanging streambanks (NaturServe 2001).

PROTECTIVE MEASURES TAKEN:

SUGGESTED PROJECTS: Surveys of historical and potential habitat, including Chuska and Lukachukai mountains of the Navajo Nation, are needed to better define the range, habitat characteristics, and life history of this little-known animal. Per Smith (1993), "successful management of the population will require 1) further assessment of the range and habitat requirements of the subspecies in Arizona, 2) efforts to maintain existing subpopulations and habitat, and 3) possible restoration of suitable habitat to increase the population's range and density, and to facilitate dispersal."

LAND MANAGEMENT/OWNERSHIP: USFS, Private. Historically, also occurred on BIA land.

SOURCES OF FURTHER INFORMATION

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MAJOR KNOWLEDGEABLE INDIVIDUALS:

Dr. Andrew T. Smith, Arizona State University, Tempe.
Dave Belitsky, Arizona Game and Fish Department, Phoenix.

ADDITIONAL INFORMATION:

The generic name *Sorex* is from the Latin *soric* meaning "shrew mouse" and the specific name *palustris* is from Latin and means "dwelling in marshes."

If the main dispersal corridors for water shrews in Arizona are the streams that they inhabit, habitat alteration above river forks could isolate multiple subpopulations, thereby cutting off dispersal corridors and drastically increasing the chances of extinction for this population as a whole (Markow and Hocutt 1994).

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